

Figure 1 Commonly used glycosylating agents

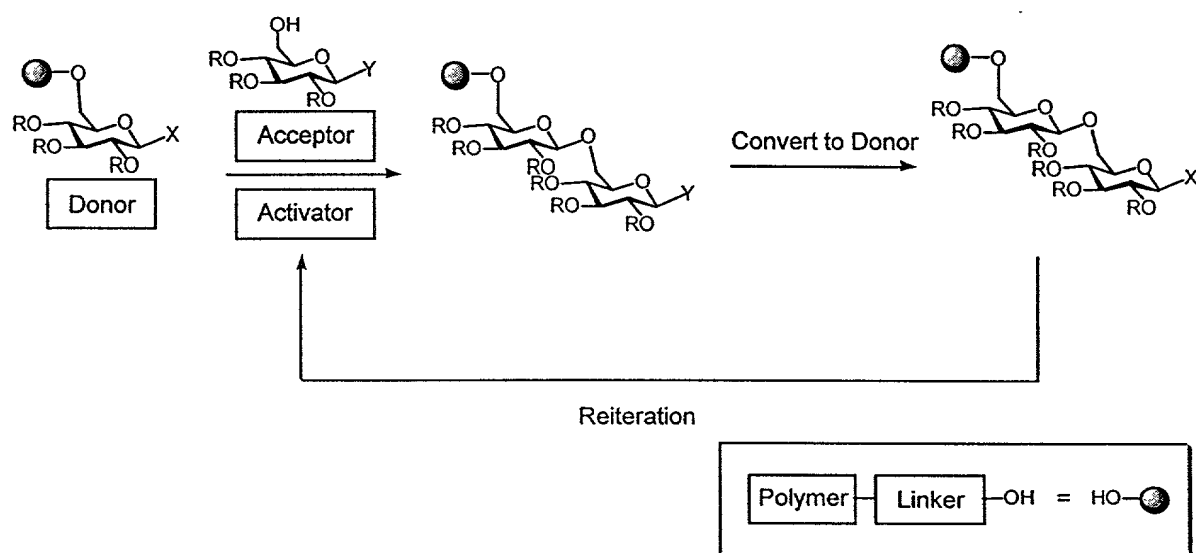


Figure 2 Donor bound solid-phase carbohydrate synthesis

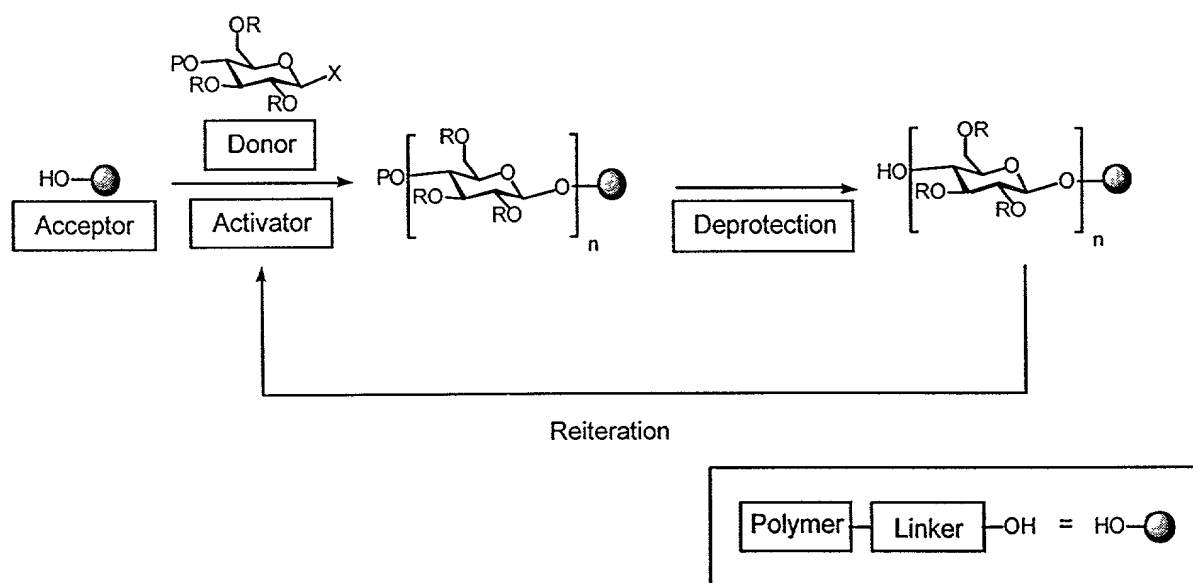
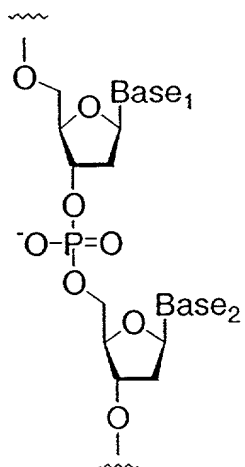


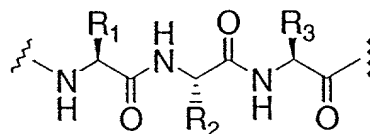
Figure 3 Acceptor bound solid-phase carbohydrate synthesis

Figure 4

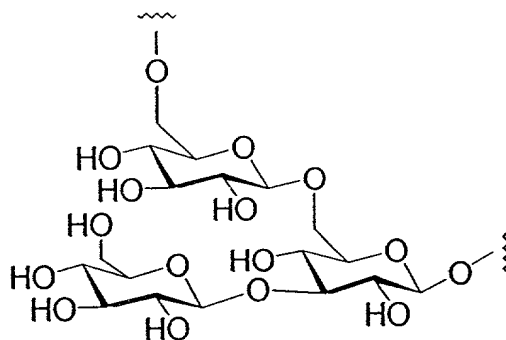
a) oligonucleotides



b) oligopeptides



c) oligosaccharides



Automated Oligosaccharide Synthesizer

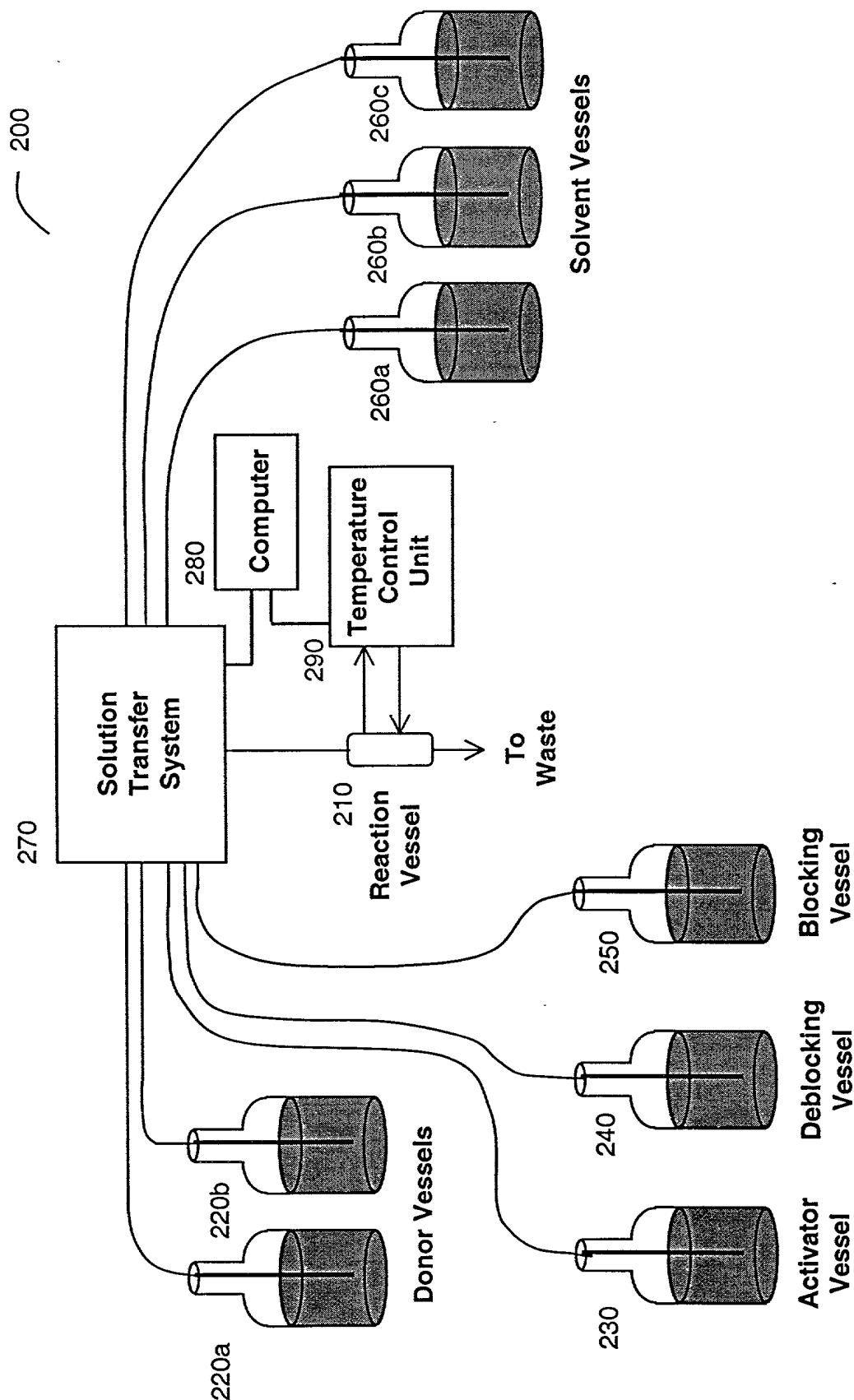


Figure 5

Automated Oligosaccharide Synthesizer

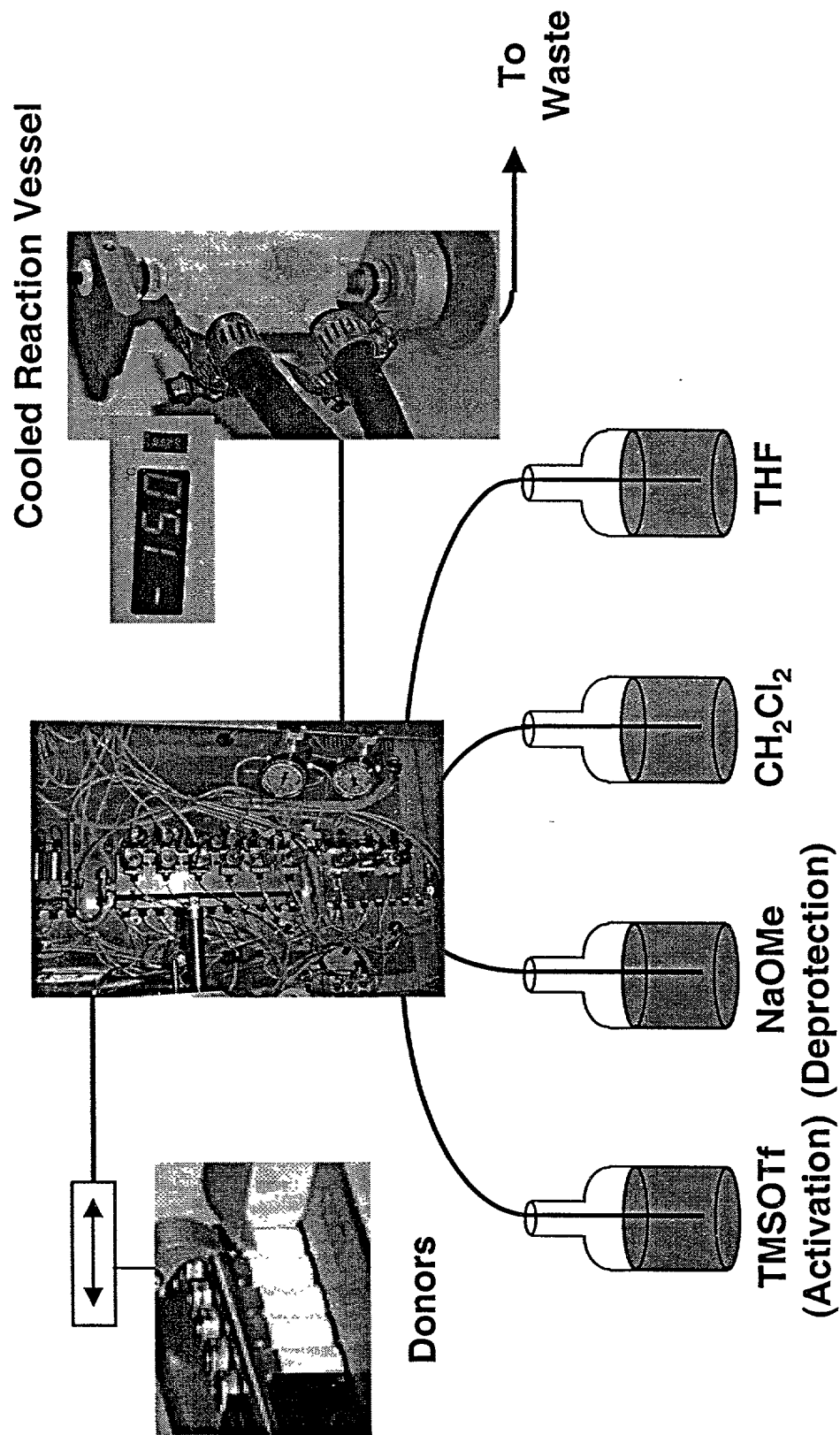


Figure 6

Double-Walled Cooled Reaction Vessel

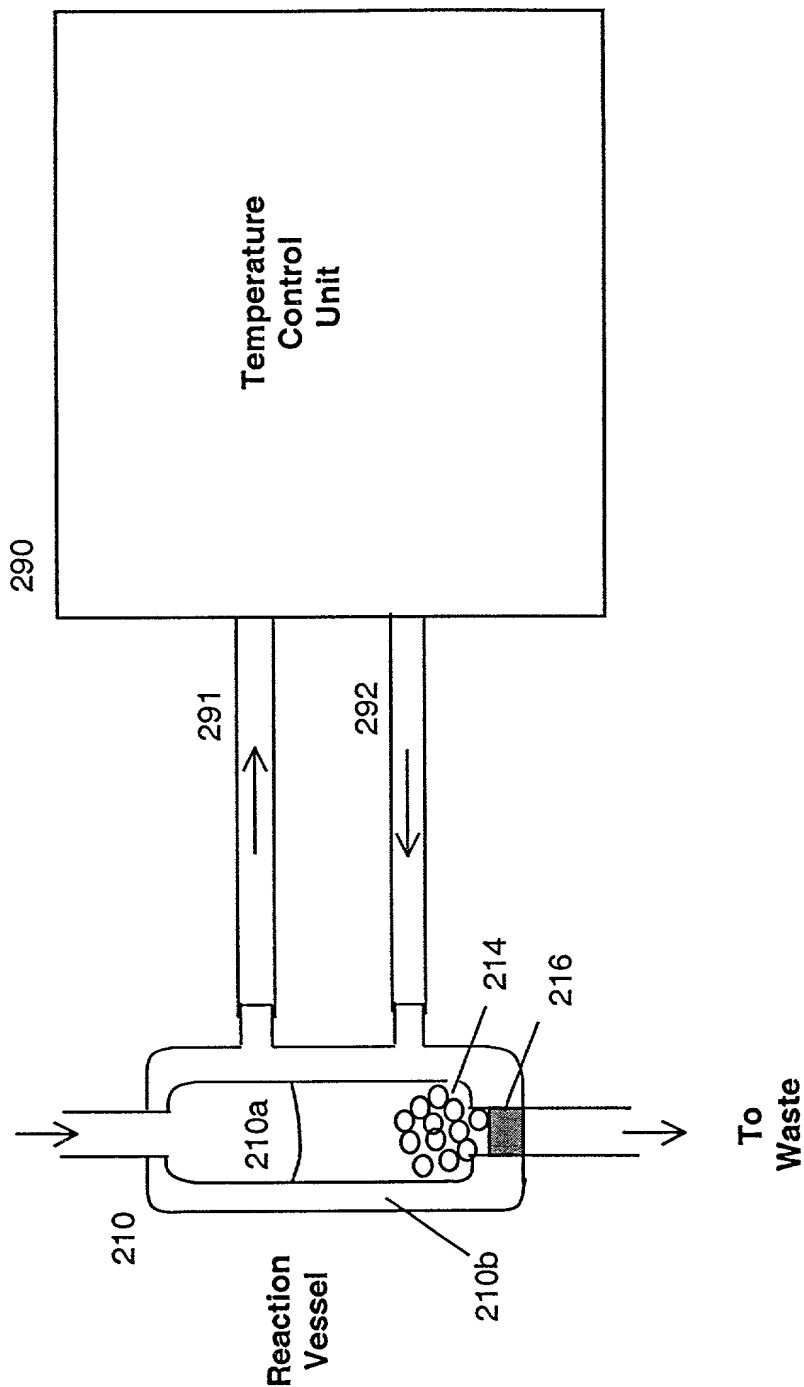
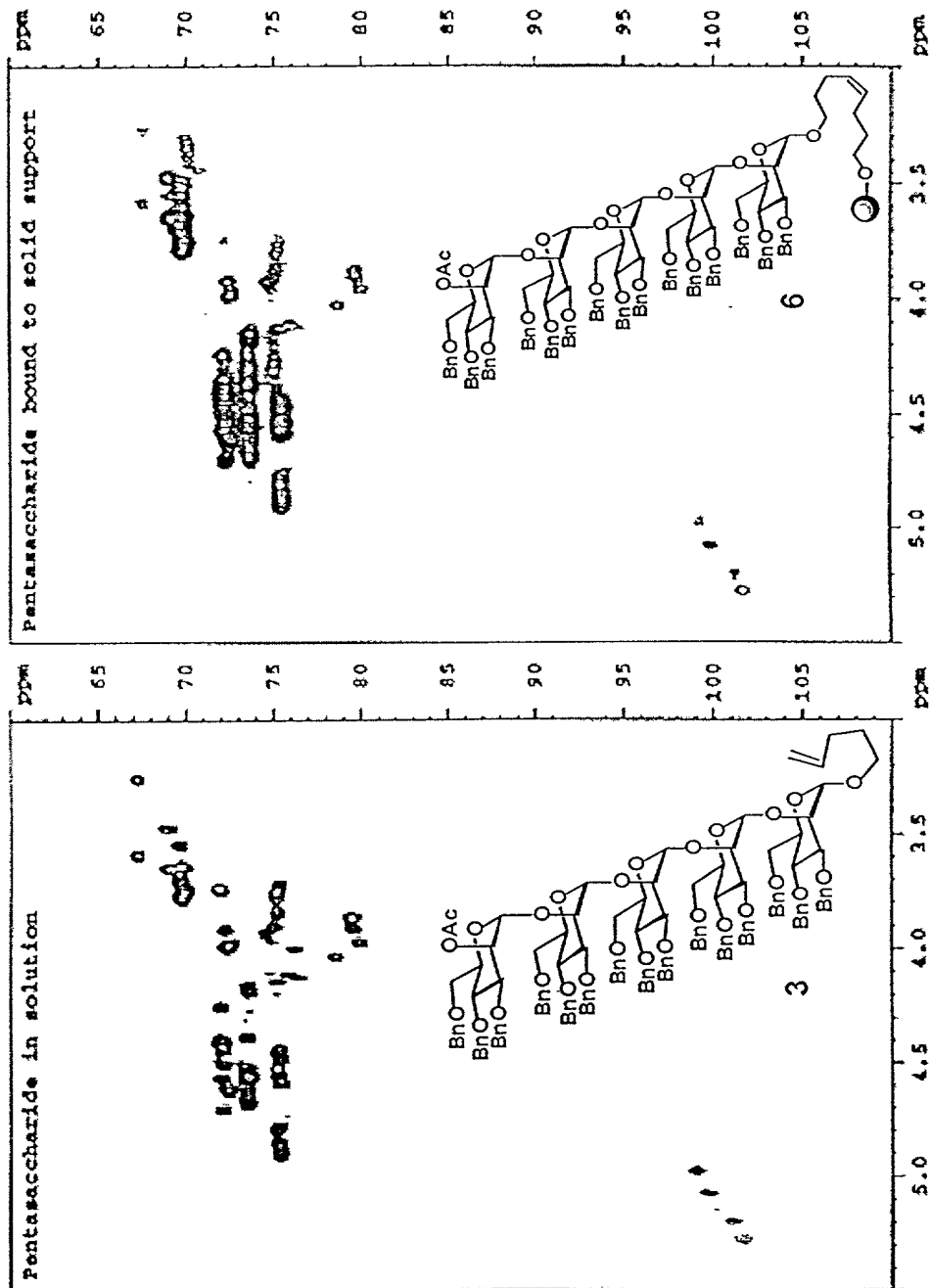


Figure 7

Figure 8

2D-NMR comparison of resin bound and solution phase pentamer



Automated Synthesis of the Phytoalexin Elicitor β -Glucan Using Glycosyl Phosphates

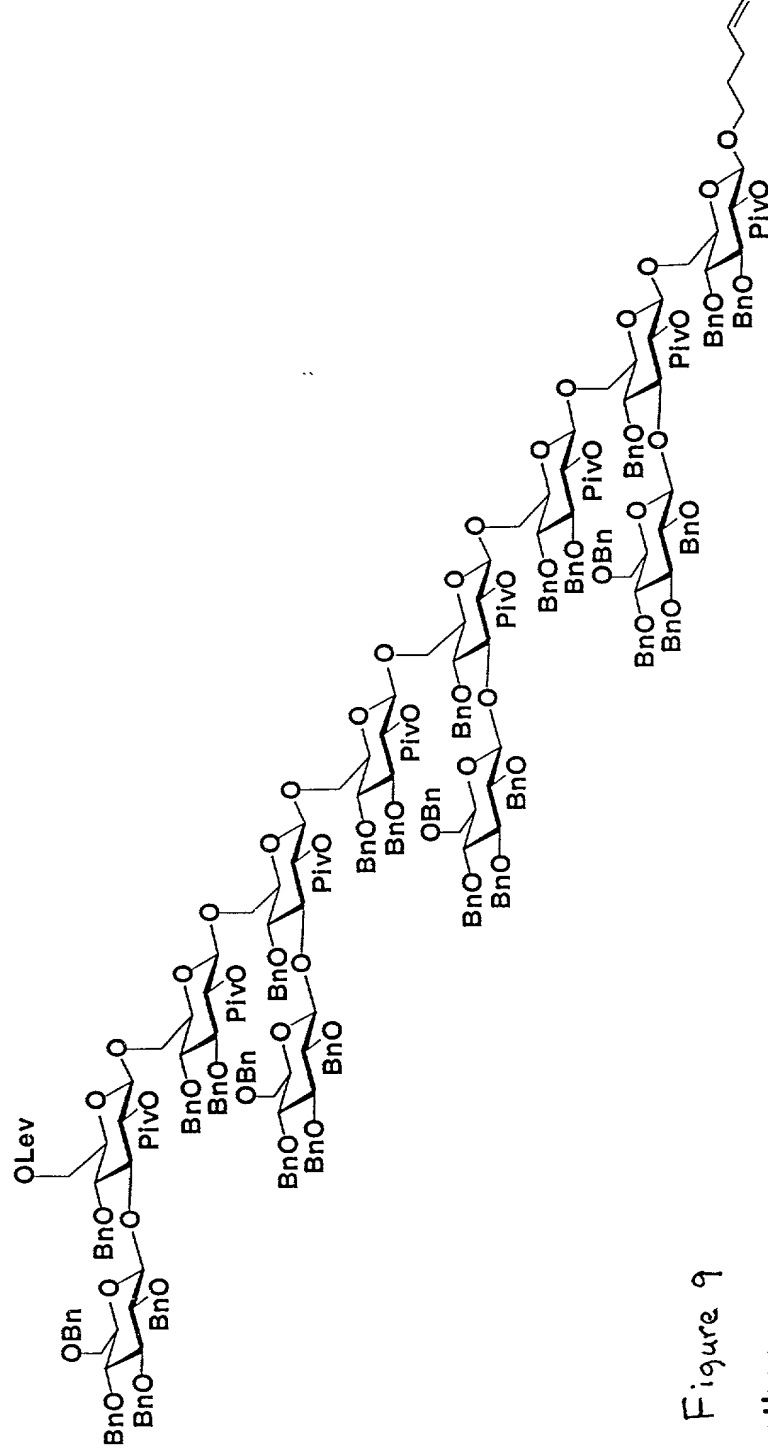


Figure 9

Prior syntheses:

Garegg et al. *Angew. Chem. Int. Ed.* 1983, 22, 793;

van Boom et al. *Chem. Eur. J.* 1995, 1, 16;

on soluble support: van Boom et al. *Recl. Trav. Chim. Pays-Bas* 1993, 112, 464;

on polymer support using trisaccharide blocks: Nicolaou et al. *Angew. Chem. Int. Ed.* 1998, 37, 1559.

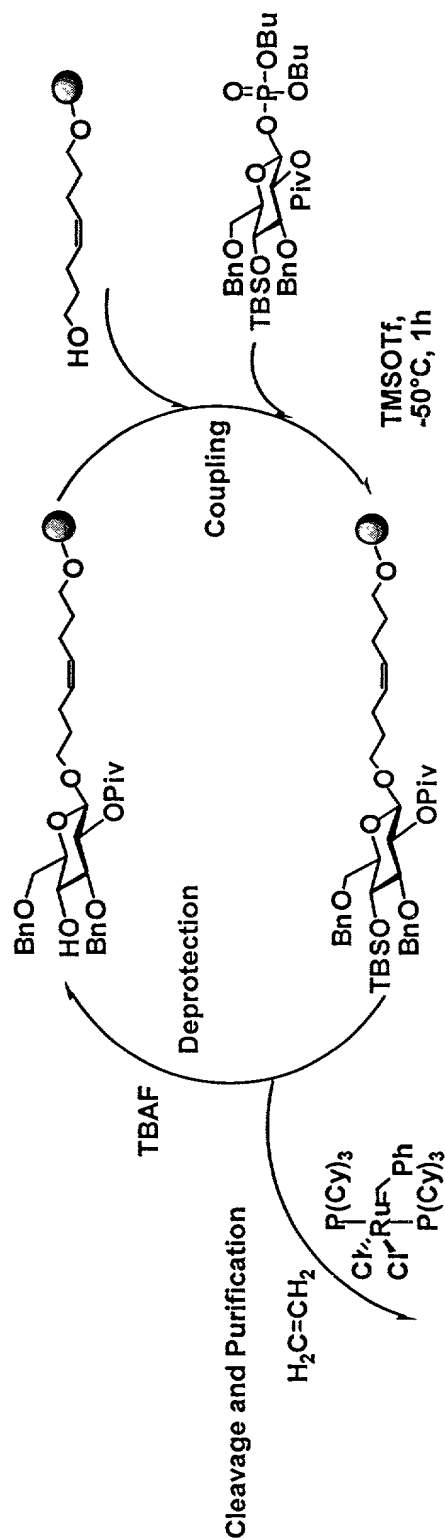
Automated Oligosaccharide Synthesis with Glycosyl Phosphates: Coupling Cycle

	Reagent/Solvent	Equivalents	Temperature	Time
Coupling	Donor	5	-15 °C	15 min
	TMSOTf	5		
Washing	CH ₂ Cl ₂ THF			5 min
Coupling	Donor	5	-15 °C	15 min
	TMSOTf	5		
Washing	CH ₂ Cl ₂ THF			5 min
Deprotection	N ₂ H ₄ -HOAc		15 °C	30 min
Washing	Pyr./AcOH			5 min
Deprotection	N ₂ H ₄ -HOAc		15 °C	30 min
Washing	Pyr./AcOH			5 min
Cycle Time per residue				110 min

Figure 11

Figure 12

Solid Support Oligosaccharide Synthesis: Glycosyl Phosphate Donors

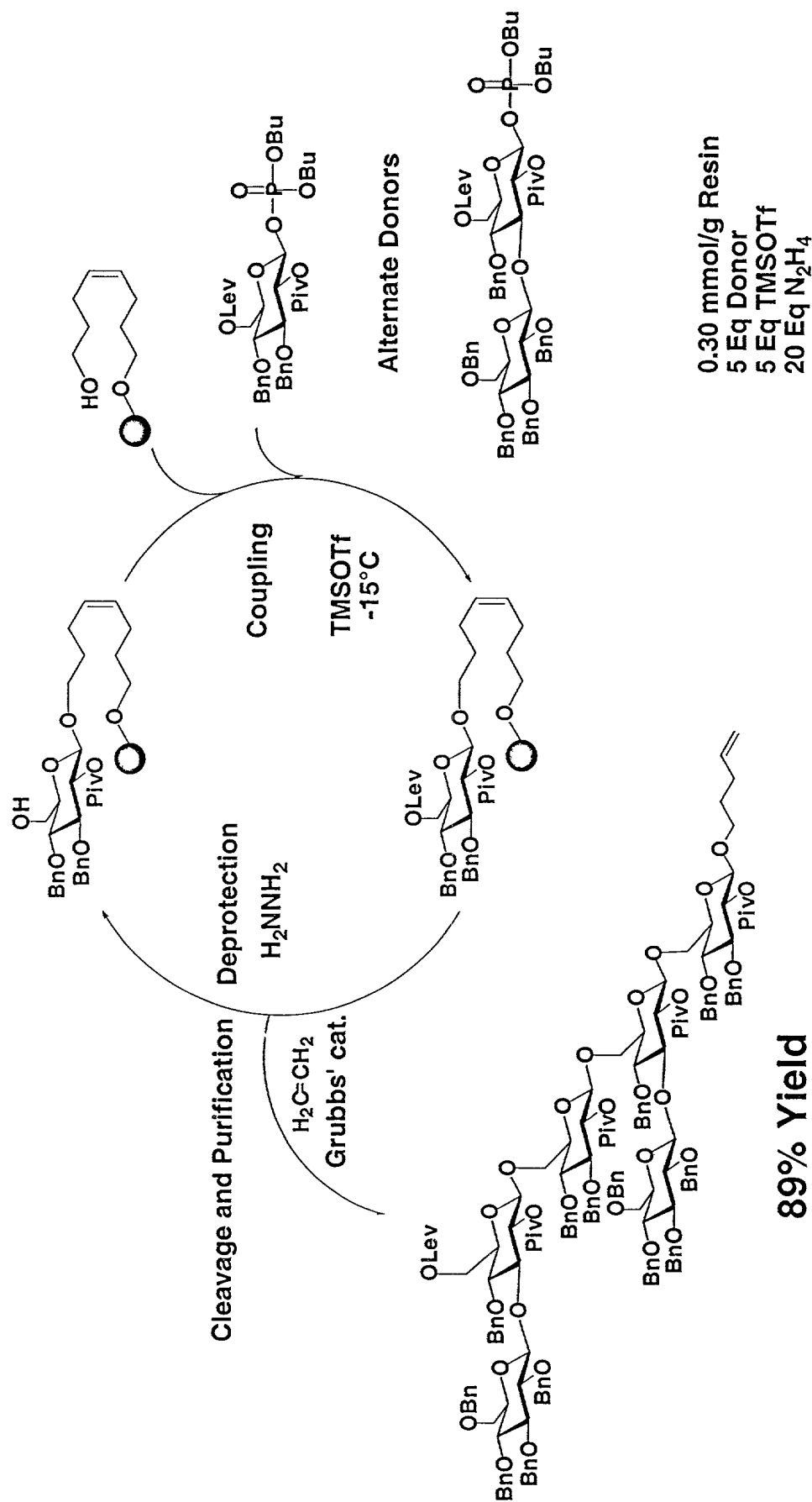


53% overall yield

- Advantages:**
- excess reagents drive reactions to completion
 - purification only at the end of the synthesis

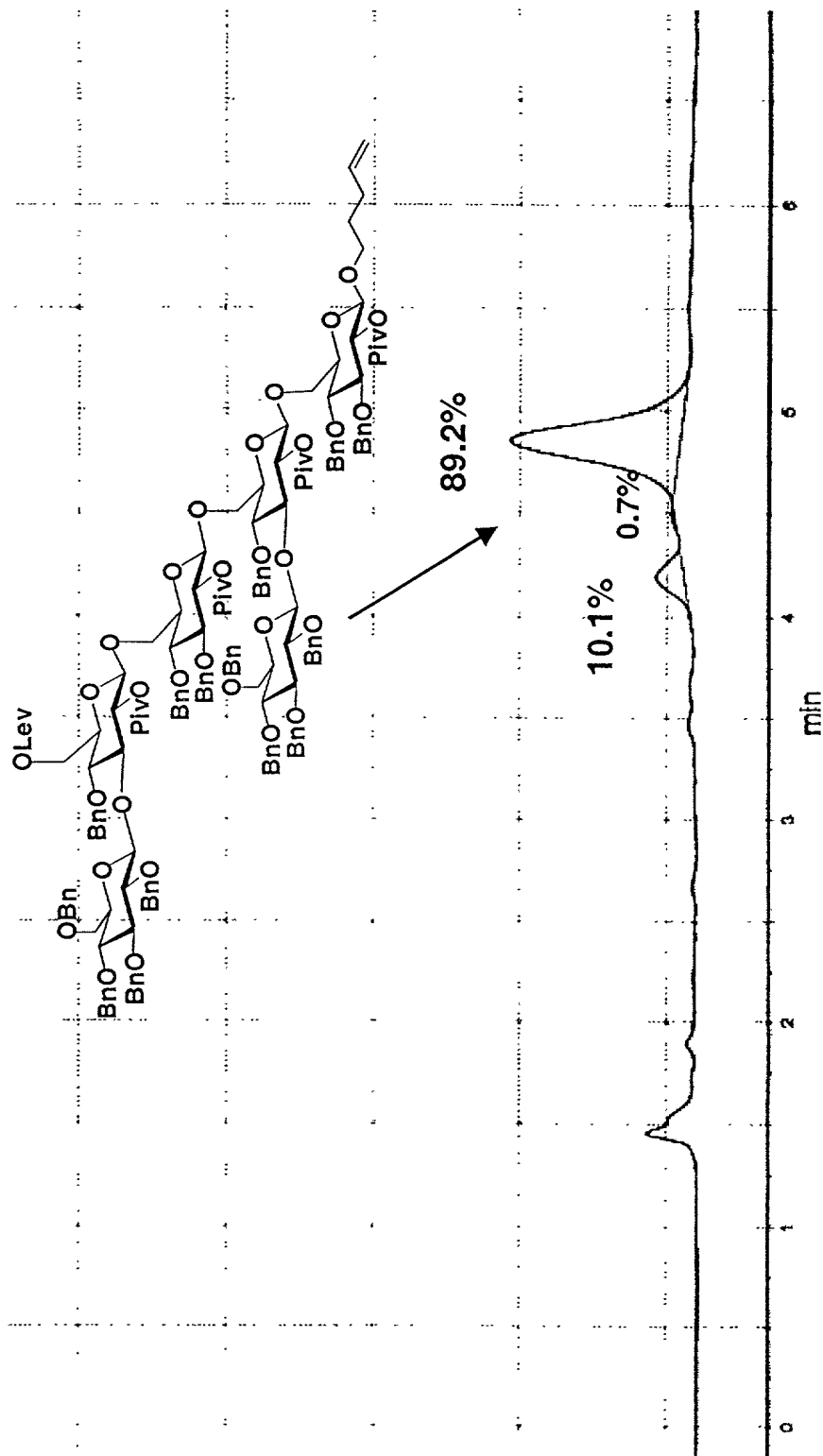
Figure 13

Automated Hexasaccharide Synthesis Using Glycosyl Phosphates



Crude HPLC Profile of the Hexamer Synthesis

Figure 14



Automated Oligomannoside Synthesis:

Coupling Cycle

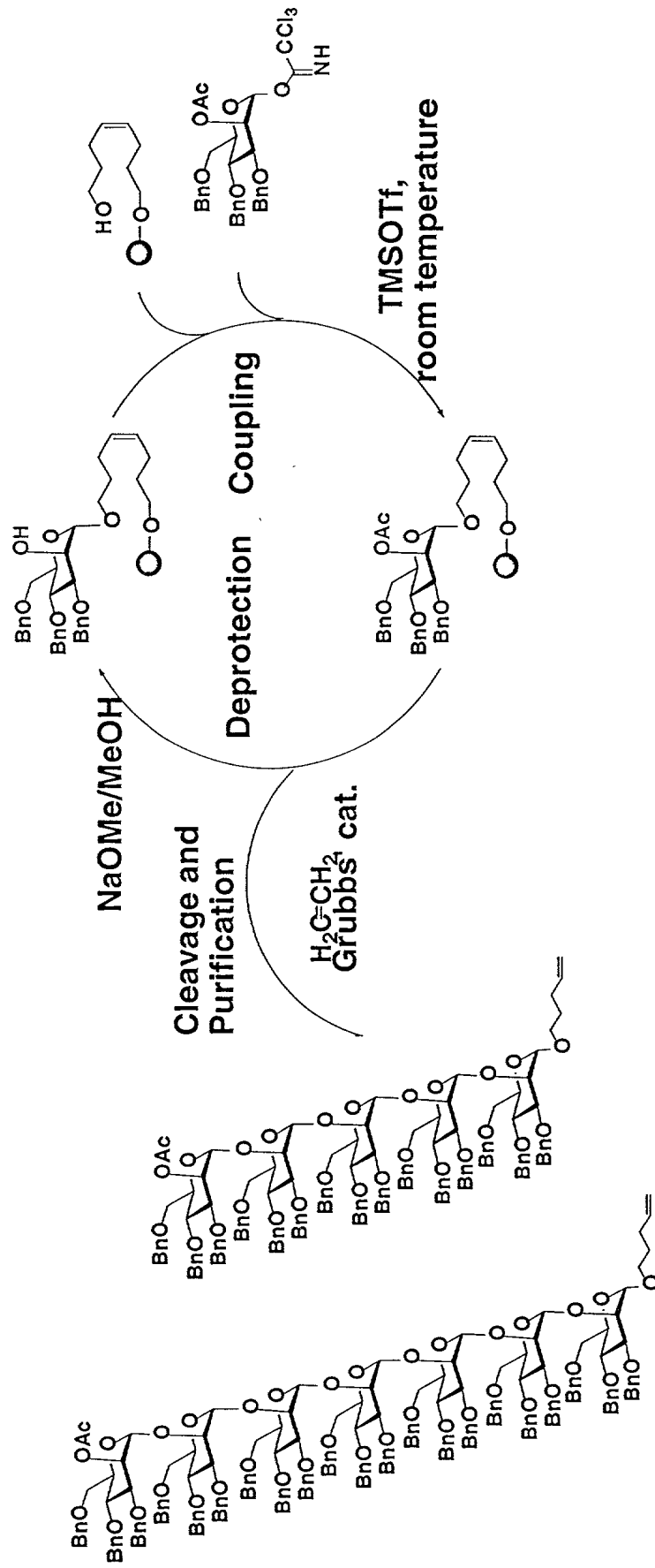
	Reagent/Solvent	Equivalents	Time
Coupling	Donor TMSOTf	10 0.5	30 min
Washing	CH ₂ Cl ₂ THF		5 min
Coupling	Donor TMSOTf	10 0.5	30 min
Washing	CH ₂ Cl ₂ THF		5 min
Deprotection	NaOMe		30 min
Washing	CH ₂ Cl ₂ THF		5 min
Deprotection	NaOMe		30 min
Washing	CH ₂ Cl ₂ THF		5 min
Cycle Time per residue			140 min

25 μmol Scale

Figure 15

Solid-Phase Oligosaccharide Synthesis: Coupling Cycle Development

Figure 16



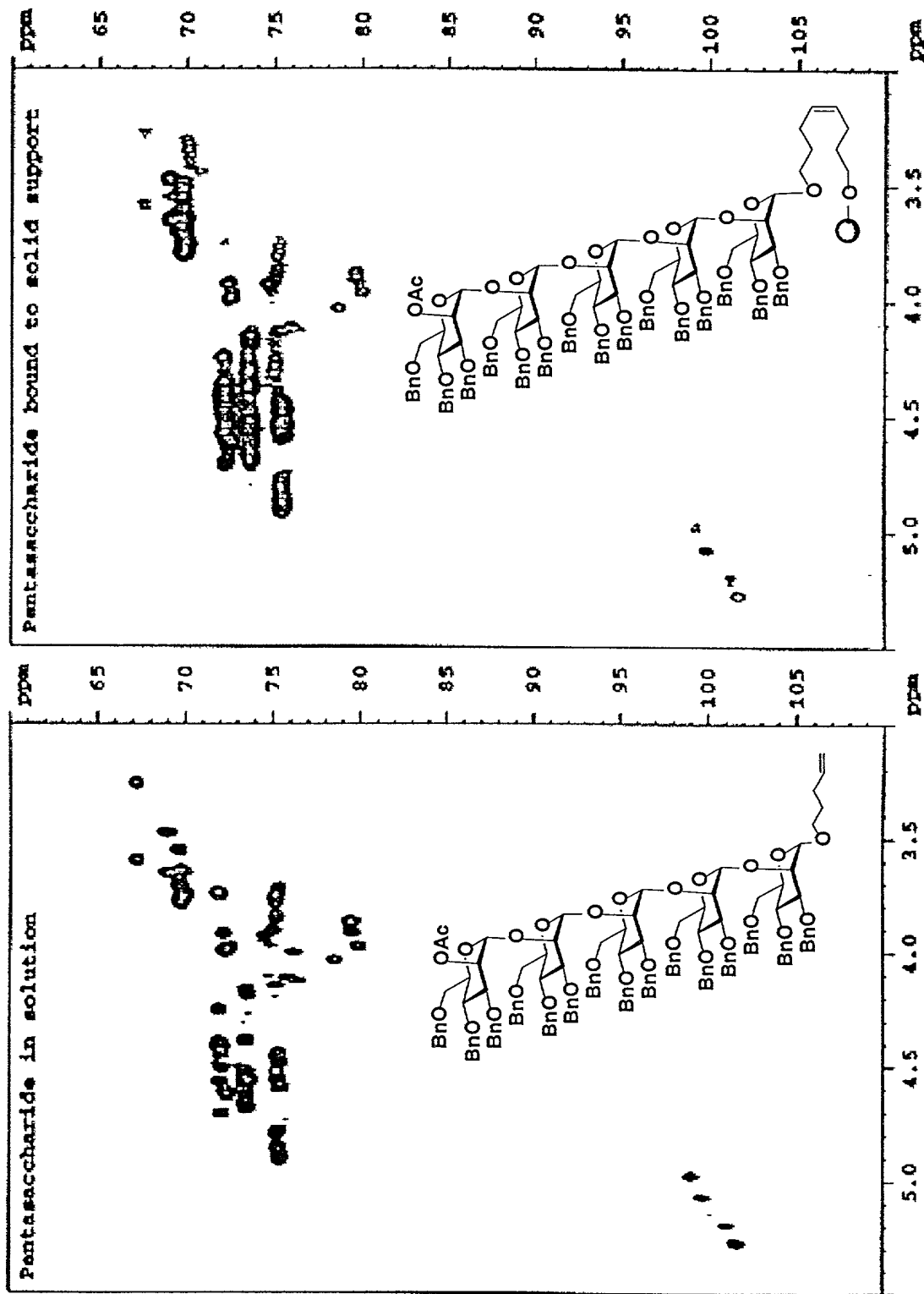
42% yield

74% yield

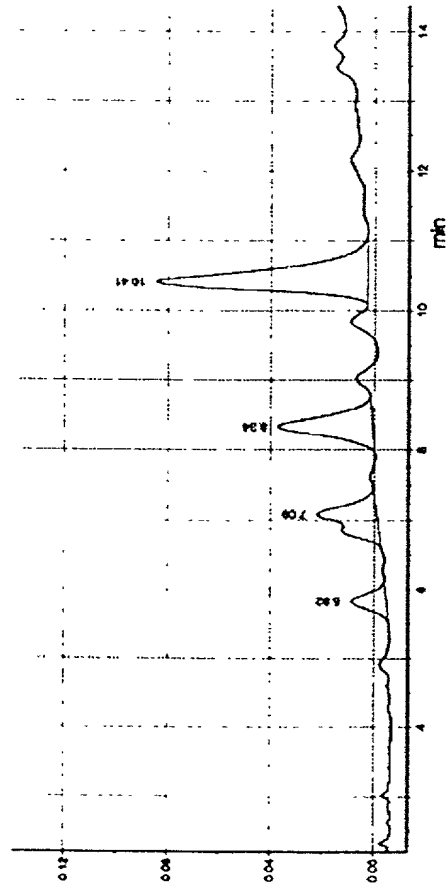
(manual synthesis: 9%)

stepwise yield: 94% stepwise yield: 94%

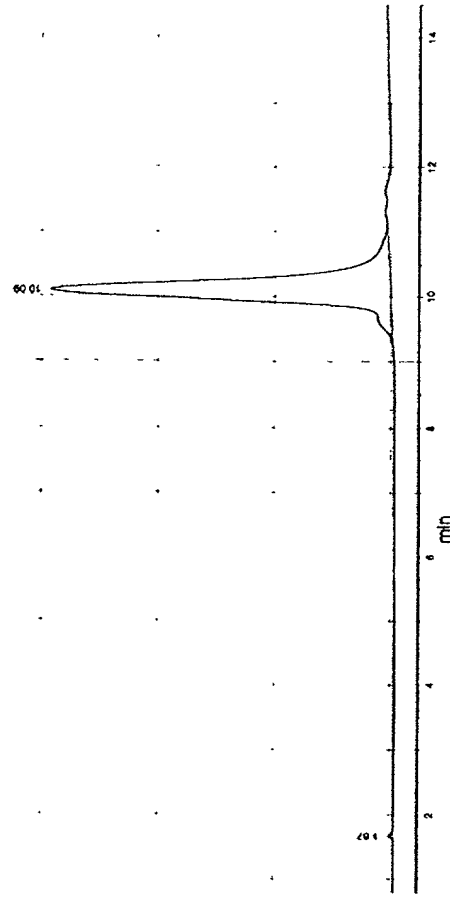
HR-MAS HMQC-Analysis of Pentamannosides



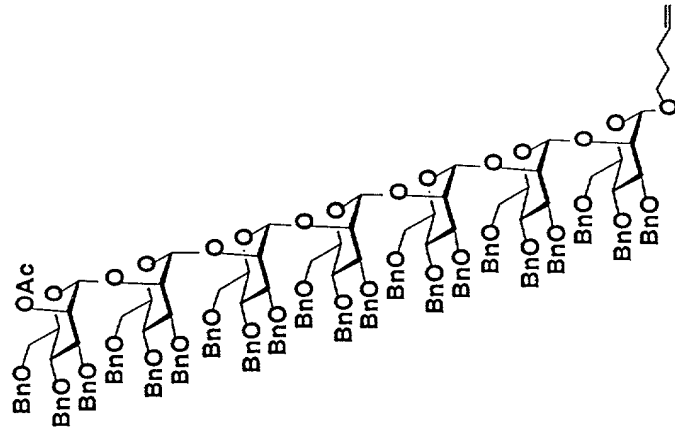
HPLC Purification of the Heptamannoside



Crude



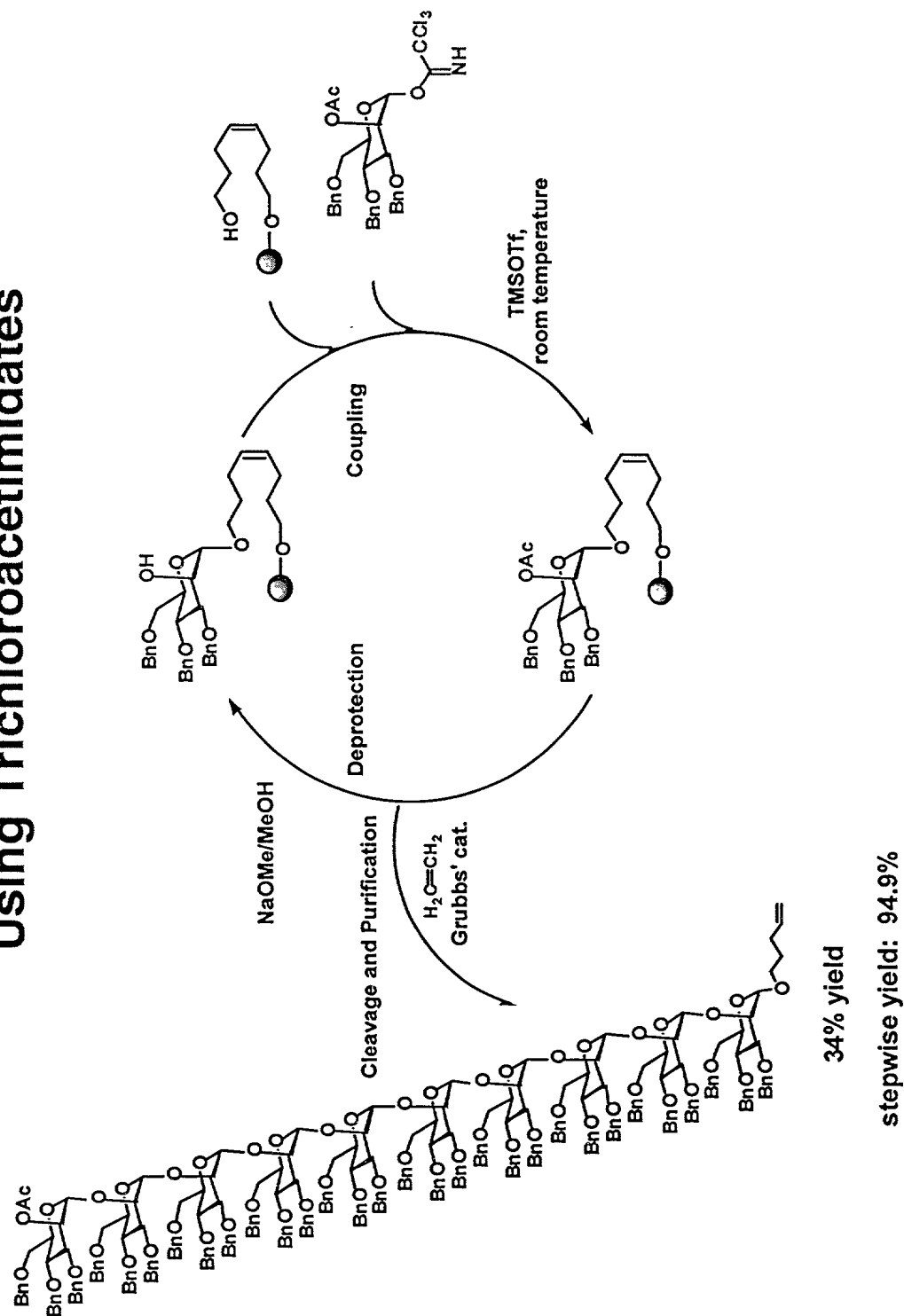
Pure



42% Yield

Figure 19

Automated Synthesis of a Decamannoside Using Trichloroacetimidates



Automated Synthesis of Leishmania Cap Tetrasaccharide

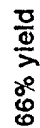
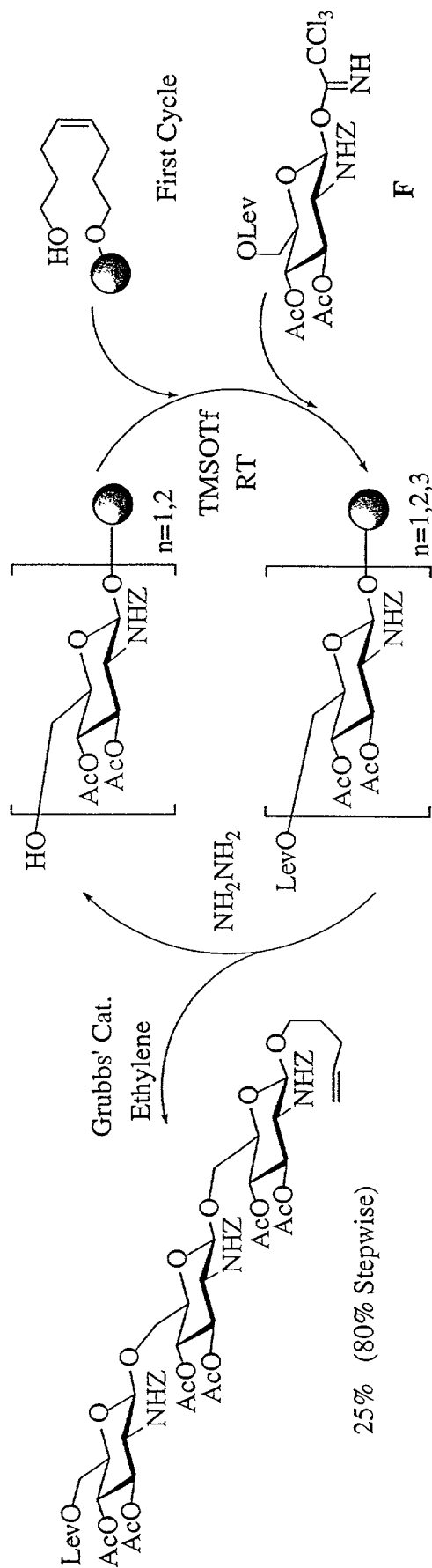


Figure 21

Automated Synthesis of GlcA Trisaccharide



Cycle:

Time: 8.5 h

Donor: 5.0 eq

Activator: 0.5 eq TMSOTf

Deprotection: 0.5 M $\text{NH}_2\text{NH}_2 \cdot \text{H}_2\text{O}$

